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This is UNEVALUATED Information

C. The Utilization of Wood

1. Resources

a. European Russia as of 1899 (including the Duchy of Finland) had 228,000,000 hectares of forest. Average forest density was 37% and there were 1.8 hectares of forest area per member of the population. On an average the state owned 65% of the forests, the private owners 26%, the peasants 6%, and the crown 3%.

b. In Lithuania as of 1911 (all subsequent data on Lithuania in this section is for this year), wood production compared to population density and need was not favorable, as shown in the table following this page.

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Govt Area	Area in Hectares	Population	% of Forest Density	Ownership	Forest Area		Production (Fest Meters)		Average Price Rubles	Value of Production		Supply per Person	
					Hectares	%	Total	On 1 Hectare		Total	On 1 Hectare	Hectares	Fest Meters
KAUNAS	3,982,000	1,660,900	15.8	State	158,300	25.52	898,175	6.3		783,005	5		
				Private	460,100	74.18)							
				Peasant	-	-)	924,000	2.0		739,200	1.65		
				Other	1,900	.03)							
				Total	620,300	100	1,822,175	2.9	0.8	1,522,205	2.45	0.38	1.1
VILNO	4,221,000	1,770,300	29.0	State	285,800	28.15	1,268,883	4.7		1,512,689	5.9		
				Private	707,300	69.68)							
				Peasant	20,100	1.97)	1,458,800	2.0		1,746,760	2.5		
				Other	2,000	0.2)							
				Total	1,015,300	100	2,727,683	2.7	1.2	3,259,449	3.2	0.57	1.5
SUVALKI	1,241,000	625,600	14.1	State	180,600	81.5)							
				Private	35,000	15.8)							
				Peasant	1,300	0.6)							
				Other	4,600	2.1)							
				Total	221,500	100	604,933	2.7	2.6	1,620,784	7.4	0.33	1.0

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c. In Lithuania, as in the rest of European Russia where no working plan was enforced, a moderate cutting rate was considered to be about 2.1 fest meters per year. This corresponded to annual production in the state forests of Vilno and Suvalki in 1903.(1) As seen in the table on the previous page, the average production was about 2.8 fest meters per hectare in 1911. The extra cutting was of surplus stock in the state forests. (By 1914, all forests in Lithuania were managed under work plans, some of which had already been revised once and even twice.) Highest production which was acceptable to the Russian forestry administration in surplus areas was 3 fest meters per hectare per year. Cutting rates in other areas (private and peasant forests) were much lower, not over 2 fest meters.(2) Normally, growth rate averaged about 2.7 fest meters per hectare per year.(3)

2. Quality and Utilization of the Yield

a. From 1890-1903, the ratio of dead to living timber varied from 27-40% but averaged out to 30% dead wood and 70% growing wood.(4) In the state forests, wood suitable for structural purposes made up 14% of the total quantity of wood cut in those forests in 1867, 30% in 1888, and 58% in 1898. The increase points up the heavier cutting in these forests from the surplus ripe stocks. The ratio was reversed in the private forests where fuel wood made up 58% of the quantity and structural woods 42%. In Lithuania from 1918-1940, the ratio was fuel wood 70% and structural wood 30% of the total quantity. This is a normal ratio which should remain about the same indefinitely.(5)

b. In 1893, wood production in all European Russia by tree type was pine 36%, spruce 30%, other evergreens 1%, oak 7%, beech 4%, birch 9%, ash and maple 1%, other hard woods 1%, other deciduous 11%, and miscellaneous 4%. The total showed a production composed of 67% evergreen and 33% deciduous trees. A somewhat similar production was obtained in Lithuania from 1918-40 as follows:

Pine	24%	Ash and Maple	4%
Spruce	37%	Birch	11%
Oak	3%	Other Deciduous	20%
Beech	1%	Total	100%(6)

In 1937, Lithuania produced 1,200,000 fest meters of structural and export quality wood (21%) and 4,459,000 fest meters of fuel wood (79%), a total of 5,659,000 fest meters.(7)

c. European Russian state forest products were utilized as follows in 1893:

Native industry	- 56,000,000	fest	meters	12%
Fuel for industry & Transport	- 10,700,000	"	"	2%
Peasant & Home Consumption	- 359,300,000	"	"	75%
Export	- 48,600,000	"	"	11%
	474,600,000	"	"	100%

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d. The supply of wood annually available in the Lithuanian Republic (approximately half the size of the former Lithuanian Province) from 1918-1940 was roughly estimated as:

Structural wood	-	300,000	cu meters	11%
Fuel	-	1,700,000	" "	63%
Export	-	500,000	" "	19%
Spoilage	-	200,000	" "	7%
		2,700,000	" "	100%(8)

3. Supply and Demand

a. Domestic Demand

(1) The demand for wood and wood products can be expressed by showing how much was used per person per year in fest meters. The expression "fest meters per inhabitant per year" (F.I.Y.) is variable since it depends on the standard of living, and material and cultural progress of the country. Thus, in ancient times the inhabitant was almost entirely dependent on wood. Almost all construction, even bridges, was wooden. In 1817, of 1,000 structures in Lithuania, only five were of stone or brick.(9) In 1930, 91.54% of all structures in Lithuania were wooden, and as late as 1938, almost 100% of the fuel consumed was wood.(10) The rural population used large amounts of wood for cooking, baking, cooking for domestic animals, and corn drying. Wood served in ancient times as torches to illuminate dwellings and barns and was used for this purpose even during World War I when petroleum was scarce.

(2) An average Lithuanian farm of 10 hectares populated by five persons consumed in a year as late as 1942 10 raummeters(11) or seven fest meters of wood, an average of 1.4 fest meters per person.(12) The city dweller used a little less, the larger farms a little more, but the overall average was 1.5 fest meters per person per year. Primitive stoves of clay used since ancient times required a great deal of fuel. In the early 1890s, a stove came into use with special cheap brick walls and heating ducts which saved a great deal of fuel. This saving was countered somewhat, however, by the introduction after 1900 of wood shingles in place of rye straw thatching. The shingles were, in turn, succeeded on the homes of the prosperous by sheets of tinplate.

(3) The average 10 hectare farmstead had buildings about 90 cu meters in volume. The rapid rate (50 years) at which these buildings rotted away because of their lack of a real foundation has already been discussed. Concrete foundations were not widely used in Lithuania until after World War I. Formerly, only brick buildings were built on solid foundations (usually field stones joined with mortar).

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As a result of the rapid deterioration, a farm annually needed an average of 1.8 fest meters of structural wood or 0.36 fest meters per person. (Five people per farm average.) Fences and other minor uses required another 0.14 fest meters per person and the total required per person per year around 1911 for all uses (including fuel) equalled 2.0 fest meters. Average demand per person per year from 1795-1830 for all uses had been about 3 fest meters. Russian statistics for 1857 showed that demand in the Lithuanian Province was 4.85 F.I.Y.(13) For all of European Russia it was figured as 3.2 F.I.Y. The former figure is exaggerated; the latter is probably close to reality. The figures of Captain Afanasyev of the Russian General Staff show a consumption of 2.53 F.I.Y.(14)

(4) The average F.I.Y. steadily declined as concrete, brick, and iron came more widely into use. Before World War I the figure was about, but not below, 2 F.I.Y. The subsequent rise in living standards raised wood consumption again for materials like paper, plywood, matches, furniture, textiles, and export, and this factor kept the demand figure fairly constant. Thus, in 1928-29 the Latvians used 2.82 F.I.Y., the Estonians 2.78, the Swedes 4.61, and the Germans 0.98. The Lithuanians used only 0.72 F.I.Y. indicating that supply was short.

b. Foreign Demand

At the beginning of the Czarist occupation, the requirements of industry were negligible and may be ignored. The export market for timber and lumber was steadily brisk. As the best timber disappeared from the Lithuanian forests, prices rose and the supply for the foreign market dropped off. Most timber went to Prussia, floated down on the rivers and concentrated at Jurbarkas, the border river port. In 1817, the Prussian market capacity was about 120,000 fest meters; in 1878, 330,000; and by the last years before World War I, it had reached 1,000,000-2,000,000 per year.(15) The export demand for wood rose steadily and Lithuanian timber, as well as Polish and White-Ruthenian, contributed to the trade /see end of report for availability of a sketch showing Russian timber export through the Lithuanian Province/.

c. The Supply

(1) In general, the wood supply in Lithuania was insufficient. The abandonment of control over the private forests forced the state forest managers to tighten up their policy and wood did not flow freely from these forests until the early 1890s. This policy caused the private owners to cut their forests freely in an attempt to fulfill the demands of their own estates, the peasants, and the export trade. The supply in 1899 for domestic and foreign sale was 2.10 F.I.Y. and in 1911 only 1.3.

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The average annual growth increment in Lithuania is approximately 2.7 fest meters per hectare and the demand was about the same. As the population grew, the supply became progressively less adequate.

(2) The demand for wood was, and still is, partially eased by the use of old wood (fences, old buildings, etc) as fuel, and by wood substitutes. Fuel wood was in short supply before World War I and in many districts (Siauliai, Marijampole, and Telshe Counties) was insufficient as early as 1857. The demands of the sawmill industries in Kaunas and Yanava were supplied somewhat by considerable quantities of excess saw logs which were taken from rafts made up in the Polish and White Ruthenian forests and reconstructed at Kaunas and Yanava. Peat has been cut in many sparsely forested areas of Lithuania since ancient times, and many landowners raised such fast growing trees as willows, alders, and aspen along roads and in swamps (especially in Marijampole and Vilkaviskis Counties) for use as fuel wood. Individuals frequently supplied themselves with wood, especially during periods of unrest, by theft from the forests and a considerable amount of wood was lost in this way. The wood shortage did not become acute in Lithuania prior to World War I because forests were being steadily converted to agriculture, the peasant forests stripped of their trees, more peat was being used, a little wood was being imported, and the state forests were being stripped of their surplus.

4. <u>The Assortment</u>

a. In European Russia in 1897 a total of 485,000,000 fest meters of wood were used by:

Industry	-	44,500,000	9.2%
Transport	-	10,400,000	2.2%
Farm & Cottage Industry	-	359,300,000	74.0%
Fuel (Industrial)	-	12,400,000	2.5%
Export	-	48,400,000	10.0%
Other	-	10,000,000	2.1% (16)

The percentage of the various uses is very close to that of Lithuania from 1918-39 and may be considered typical. It has been shown previously that the ratio of structural wood to fuel wood was about 44 to 56. The ratio changed later (1918-39) in favor of fuel wood.

b. The assortment of wood required for domestic use did not change appreciably during the Russian occupation. The assortment for export to Europe in 1890 consisted of:

Sawed Products	-	57%
Hewed "	-	3%
Round timber and other wood	-	25%
Other structural wood	-	9%
Cord (fuel) wood	-	6%
		100% (17)

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The forests and wood industry of European Russia produced the following for export:

(1) Pre-fabricated material for homes (walls, doors, roof, etc.)

(2) Paper Pulp

(3) Naval Stores (tar turpentine, etc.)

(4) Sawed Lumber. (Planks, battens, and boards differing in dimension. Planks were not less than 3" x 9"; battens not less than 2" x 4"; and boards not less than 1/2" x 4". Most planks were 15-16' long and boards were 14-15'. Sawed lumber was valued according to its quality in four grades. In 1898, European Russian lumber production consisted of 20% first grade, 45% second grade, 20% third grade, and 15% fourth grade. The sawed lumber was produced according to English measurements, sold by the Russian standards (165 cu ft), and priced by an average length of 8'.)

(5) Hewed Wood. (Various beams which were primarily fabricated in the forests. They included English and Dutch beams, Plancons, and wainscots. Dimensions varied and lots were sold and shipped in units of 50 cu ft.)

(6) Round (rough) Timber. (The bark was not removed and dimensions varied. Primarily pine and less spruce was sold in this manner. Mast timber of the greatest length was sold this way as were posts which came in 3-9' lengths with a thickness of 3-7" on the upper section. Standard pulp wood (mostly spruce) was sold in logs about two meters long.)

(7) Oak Staves. (Came in various dimensions.)

The most popular export woods in Lithuania were pine and spruce timber, pulp wood (since 1870), staves, mine timber, and hewed products (e.g. ties). Very little sawed lumber was exported because of the prohibitively high Prussian tariff against it. The export of fuel wood grew larger every year.

c. The high Prussian tariff caused the Russian government to turn in 1910 to the construction of the Venta-Dubysa Canal at the expense of the Farm Bank of Russia. The canal was begun a kilometer north of Lake Rekijavo (Siauliai County), and ran along the Siauliai-Radviliskis railroad for 17.5 kilometers, thereby connecting the upper Dubysa (a tributary of the Nemunas River) with the upper Venta. The Russian government hoped to avoid floating timber to Prussia and to divert timber from the Nemunas to Vindava in Latvia, then a Russian Baltic Port. The Prussians lowered their tariff and canal construction slowed down. Export of sawed lumber rose 30% in 1913. The beginning of World War I interrupted work on the canal. It was renewed in 1918 but for drainage purposes, not for floating timber. There was no longer any point in the project for its original purpose, since the Nemunas' outlet to the Bay of Kuronia and the Baltic Sea now belonged to Lithuania.

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5. Industrialization

a. The most heavily industrialized district of the northern portion of the former Polish Kingdom was the area later included in the government area of Grodno, but even here there were only such small establishments as wooden saw frames working off the water-driven power of corn mills. They produced only for home consumption and not for sale. Saw mill production in all of European Russia did not amount to more than that in Grodno until the 1850s.(18) In the 1860's, regular saw mills with English frames were introduced, and planing and groove benches came into use in the late 1890s. By 1887, there were 567 saw mills in European Russia with 15 thousand laborers, and a production valued at 17,000,000 rubles; in 1897, 1,266 with 42 thousand laborers, which produced materials valued at 70,000,000 rubles.

b. In 1887 shops to manufacture fabricated materials (doors, frames, etc) and packing cases numbered 133 with 5,530 laborers and production of 7,000,000 rubles worth of goods; in 1897, 431 shops employed 20,493 persons and produced 16,000,000 rubles worth of material. Other shops producing such items as wheels, cars, wooden nails (for shoes), excelsior, reels, etc, numbered 75 in 1887 with 2,215 laborers and a production worth 2,000,000 rubles; and in 1897, 195 such shops employed 625 people and had a production worth 5,000,000 rubles. There were 80 barrel shops in 1900 with 3,037 laborers producing three million rubles worth of barrels. Other industrial installations included:

Type	Date	No.	Laborers	Value of Production
Pulp shops	1887	19	437	500,000 rubles
	1897	26	487	1,000,000 "
	1903	48	1,762	1,400,000 "
Match Shops	1887	64	4,694	500,000 "
	1897	111	11,273	200,000 "
Wood Distillation Shops	1887	240	1,208	600,000 "
	1897	246	1,301	1,000,000 "
Bark Mills	1887	6	35	30,000 "
	1897	8	47	60,000 "
Charcoal Shops	1887	9	192	20,000 "
	1897	11	167	20,000 "
Cellulose Shops	1903	7	2,023	1,800,000 "

c. There were no cellulose shops in Lithuania until 1914; only a few mills which produced wrapping paper and cardboard from pine pulp. In the three government areas of the Lithuanian Province the following forest industries were operating as of 1908:

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Enterprise	Kaunas				Vilno				Suvalki			
	No.	No. of Em-ploy-ees	Pro-duc-tion in Rubles	Horse Power Used	No.	No. of Em-ploy-ees	Pro-duc-tion in Rubles	Horse Power Used	No.	No. of Em-ploy-ees	Pro-duc-tion in Rubles	Horse Power Used
Cardboard Shops	3	67	73,100	271	5	156	165,400	600)				
Paper Mills					13	627	1,357,000	647)				
Saw Mills(19)	24	367	386,700	735	17	428	952,300	573)	11	228	155	-
Furniture Shop	1	40	35,000	12	3	117	86,100	6)				
Excelsior Shop	1	15	2,900	15	1	79	34,900	110)				
Match Shop	2	202	116,300	14	1	28	12,500	10)				
TOTAL	31	691	624,000	1,017	40	1,435	2,608,200	1,946	11	228	155	-

(20)

Combined match production in Kaunas and Vilno with only three small shops rose in 1912 to 3,307,400 units (pocket size packets). The lumber most valued by the forest industries was pine.

6. Commerce

a. Producers and Their Prices

(1) State forest production was most important and valuable during the last years of the Czarist occupation. State forest products were priced according to the price schedule of the territorial bureaus. These schedules were graded according to the forest location and had three levels: high, medium, and low. For example, the prices of a cubic foot of solid wood at the stump was as follows:

Pine (Grodno & Vilno):	High quality	17	kopeks
	Low "	7	"
Spruce (Kaunas & Vilno) :	High quality	7-10	kopeks
	Low "	2-4	"
Oak (Grodno & Vilno) :	High quality	16-29	kopeks
	Low "	4	"
Birch Fuel Wood :	High quality	3-4	kopeks
	Low "	1	"

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By way of comparison, average prices in Prussia and Bavaria from 1850-55 for a fest meter (35.3 cu ft) of solid wood were:

1872-1875	Prussia	6.6 marks
	Bavaria	7.4 "
1880-1886	Prussia	6.5 "
	Bavaria	7.1 "
1902	Prussia	7.8 "
	Bavaria	9.9 "

As mentioned above, all purchases were accomplished by contract. In general, it was difficult for a small purchaser (peasant or small merchant) to buy from the state forests because of the large land units involved (the result of the lack of personnel in the forestry service).

(2) Wood from private forests was priced in accordance with that from state forests but was generally cheaper. Large sales were by written contract but smaller ones by verbal agreement and there were seldom any auctions of private forest stock. Terms for the buyer could be arranged. At one time, owners frequently borrowed money from the lumber companies to be repaid later in lumber but this practice died out. Fuel wood from the private forests was often more expensive than that from the state forests. Structural wood was cheaper since that available in the private forests was limited and of lower quality. In general, it was easier to purchase wood from the private forests because they were willing to sell an individual tree. It should be recalled that private forest cutting was controlled after 1888.

(3) Peasant forests of lower quality (sparsely forested with young growth) were never controlled. The peasants usually used their timber for their own purposes or sold it as fuel to nearby towns. They seldom sold wood to merchants. Some towns in 1880-90 received 100% of their wood supply from peasants. Some of the wood supplied by the peasants was purchased by them in the state forests for resale. Their prices included the cost of transportation and sometimes amounted to a ruble or more for one Raummeter of wood. The trade in fuel wood was always an important source of income for the peasant and he played an important role in the economy of the towns as the deliverer of their fuel. When wars and other unrest cut off these deliveries, the towns frequently found themselves in a critical situation. The peasants paid no taxes on the income from the wood they sold.

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b. The Merchants and the Wood Trade

(1) Three types of merchants participated in the domestic wood trade. The small operators bought wood (primarily fuel), transported and stored it (at railroad stops, on river banks, or near towns), and sold it to individuals or institutions within the towns. They paid taxes as established merchants and ran their businesses on small capital and limited credit; the more successful merchants operated with larger capital and longer credit arrangements, and usually ran a saw mill. They participated more in the trade in structural wood and also handled fuel wood. There were usually a couple of these merchants in each county seat and more of them in the larger cities; a few merchants operated on a large scale within the country. They bought and sold large quantities of wood wholesale for both domestic and foreign consumption. The merchants were all in close contact and frequently served as agents for another merchant or for a foreign concern. Most of them were Jews. They had a good organization with mutual credit and support, and they profited as the wood business continued briskly. Their commissions as agents usually ran 2-3% but were sometimes as high as 5%. Many of them had subagents, and hired personnel as well. Business methods were generally primitive except in the case of the largest merchants who did business in the millions of rubles and were well organized.(21) The bookkeeping of the small operators was minimal. An individual might not even get a receipt if the transaction was small.

(2) Best profits were obtained in dealings with the state or with public institutions. The prices obtained by the merchants varied a great deal, depending on type, quality and distance delivered. Fest meter of structural timber delivered from the forests to Kaunas in 1914 cost 5-6 rubles. A Raummeter of fuel wood under the same conditions cost 1.5-3 rubles.

(3) The following prices on export timber were in effect in Riga in 1903:

(a) Pine beams - hewed, 24-27 foot lengths, 1 English cu ft = 50 kopeks

(b) Spruce beam - same in 27-28 foot lengths = 33 kopeks

(c) Pine timber - 20-22 foot length, 11 inch diameter, 1 Dutch cu ft = 16.5 kopeks

(d) Spruce timber - same = 16.5 kopeks

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(e) Ties - 19 foot length, 10 inch diameter, = 1.59 rubles

(f) Oak Staves - 1 2 1/2" x 5" x 42", 29.8 kopeks
1 3" x 6" x 42" 32.0 "
1 2 1/2" x 5" x 72" 65.0 "
1 3" x 6" x 72" 100.0 "
1 3" x 6" x 96" 140.0 "

After 1890, prices rose steadily, on an average 20-25%. In Jurbarkas a boundary port on the Nemunas, the average price for a fest meter of pine or spruce was 6.7 rubles.(22)

(4) Prices in London in 1903 for wood exported from Russia ran as follows:

(a) Boards of Riga, first and second quality, apiece 75.2 kopeks

(b) Boards of Canadian quality, apiece
1st 24.24 "
2nd 197.5 "
3rd 121.8 "

(c) Pine beams - per fathom 47.29 rubles

(d) Staves of Memel Crown Quality, apiece 212.8 kopeks

(5) Prices in Hull in 1903 for Russian wood were:

(a) Pine timber - for 1 cu ft,
Memel 1st quality 89.9 kopeks
" 2nd " 73.3 "

(b) Pine boards - 3" x 9" x 11 1/2",
1st quality 191.6 kopeks
2nd " 164.3 "

(c) Spruce boards (same size)
Riga 1st quality 89.5 kopeks

(d) Staves - apiece
Memel Crown Quality 196.3 kopeks

Lithuanian lumber exports went mainly to southern Russia.(23)

7. Labor(24)

a. Labor forces were almost always recruited from the peasant population, hired on a verbal agreement, and paid at piece-work rates (seldom by the day). Payments were made in three installments; one-third at the time of agreement, one-third after hauling, and one-third after floating was completed. Piece work was figured according to the cubic foot, cord, or piece. Daily earnings in 1908 for a worker without transport varied from 30-125 kopeks and averaged 55-65.

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A worker with a horse cart could earn 50-200 kopeks and average 120-140 a day. The piece rates for felling a pine tree were 1-5 kopeks; and for removing the bark 4-10 kopeks. Rates for spruce logging were lower; those for oak and ash logging were higher. Payment for forming ties was 5-15 kopeks apiece. A similar amount was paid for hewing each meter of a beam. A sawmill charged 3-4 kopeks for each cubic foot. The cost of producing one raummeter of cord wood was 12 kopeks.

b. Labor was always abundant and, thus, poorly paid. By way of comparison, in 1911 the annual wages of industrial workers in Lithuania were:

minimum	219 rubles
average	431 rubles
maximum	543 rubles(25)

Thus, laborers in the wood industry worked at a rate near the minimum wage. Logging technique was described above and did not change except that wire was introduced to tie rafts together at a saving of wood. The relation between employer and employee was regulated by Russian laws which were far from perfect but which were adequate for the time.(26)

8. Transportation and Its Costs

a. Transportation by road did not change from 1795-1915, and afterwards. It was essentially by horsecart, which changed only by the introduction of steel axles. In 1908, to transport a fest meter of wood in one meter lengths cost, depending on the distance:

0-5 km	10 kopeks
6-10 km	17 "
11-15 km	25 "
16-20 km	30 "

For the same distances, ties were charged for at rates of 5, 8, 10 and 12 kopeks, and for "slippers" (larger ties) 7, 10, 15 and 20 kopeks. A raummeter of cord wood could be transported 5 km for 30-40 kopeks. Drivers, carts and horses were in abundant supply.

b. There was a total, in 1904, in European Russia (excluding Finland) of 129,203 kilometers of navigable rivers. Of this total only 47 thousand kilometers were suitable for floating logs. In the Baltic Provinces, the Nemunas and western Daugava were the most important rivers suitable for floating logs. The Nemunas had 2,000 km of water suitable for this purpose but only 100 km which were adequate for floating loaded barges (below Kaunas).(27) The Daugava, which had a total length of 6,600 km (including its tributaries), had 3,300 km suitable for floating logs but only 330 km adequate for loaded barge traffic.

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Floating conditions on the Nemunas were discussed above for the period 1848-1856. For the period 1892-1901, the average annual number of log rafts (one raft equals 100-150 fest meters) on the Nemunas totalled 14 thousand, with a weight of 900 thousand metric tons and a value of 4,000,000 rubles. Rafts grew in size to include an average of 400-600 cubic meters of wood when iron wire became available with which to fasten the logs. Crews were usually paid on a monthly or weekly basis, seldom daily. Monthly salary, depending on a worker's experience was 7-25 rubles. Piece work rates based on delivering a 100 log raft from the upper Vilija to Kaunas were 40 rubles and from Kaunas to Tilsit, 30 rubles. To build a raft cost 60 kopeks a log. The trip from Vilno to Kaunas took three days and from Vilno to Koenigsburg took six days if conditions were good.

c. A small portion of the timber from Lithuania was floated from the districts of Vilno and Kaunas along the tributaries of the Daugava to Riga. There it was fabricated for export to Europe, primarily as saw lumber. The product was known as Riga ware and had a good reputation throughout Europe. The larger part of the Lithuanian exports and of the White Ruthenian and Polish exports were floated on the Nemunas and its tributaries to Prussia. For a long time all wood went to Koenigsberg and Danzig where a brisk trade in wood had existed since 1800 with England and other western European countries. The first saw mills to produce lumber for export were established in these ports. For a long while, Klaipeda was a transit point for timber coming down the Nemunas consigned to Koenigsberg. After 1840, the Minge Canal was cut, thereby allowing timber rafts to avoid the dangerous Bay of Kuronia. As a result, Klaipeda steadily grew in importance as a lumber port. The first saw mills were established there in 1840. They were wind driven and utilized heavy, slow-moving wooden saw frames. These were later changed to iron frames but speeded up very little since the iron frames were even heavier. The mills worked mainly during the winter months and effected a fairly clean cut on the material. By the end of the 19th Century, Klaipeda was the main center manufacturing lumber from Lithuanian wood.

d. While transporting wood in rafts was cheap, the value of wood transported this way dropped 30%.(28) Wood carried by railroads did not lose its value, but Russian railroads in the middle of the 19th Century were very limited and very expensive (three times the cost of floating wood). Railroads did not become practical for wood shipments until the 1880s. Then their use enabled a merchant to turn over his capital three to four times faster.(29) Railroad lines in Russia in 1840 totalled 30 km; in 1850, 418 km;

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in 1860, 2410 km; in 1870, 11,707 km; in 1880, 24,397 km; in 1890, 33,328 km; and in 1900, 52,900 km. In 1913, the Lithuanian Province had the following railroad lines (Russian gauge):

Area	Length	Density Per 1000 Sq Km	Length Per 1000 Inhabitants
Kovno	606 km	14.1	33.7
Vilno	1,184 "	26.4	60.4
Suvalki	243 "	19.0	36.3

e. Main loads carried by railroads in Russia in 1897 were 8,400,000 tons of corn products; 8,200,000 tons of coal; 6,100,000 tons of wood products; and 3,700,000 tons of oil products of a total of 111,700,000 tons. The load limits of wood for one railroad car were:

Hardwood	12 metric tons
Birch	11 " "
Pine, Spruce, Aspen & Alder	10 " "

A single car of 10 metric tons capacity carried on an average 78 raummeters of fuel wood (2 meter logs). After 1896, transport prices were lowered and railroad transport of wood rose considerably. In 1893, loads totalling 5,000,000 tons were transported; in 1896, 6,000,000 tons; and in 1899, 8,000,000 tons. In 1890, 2,250,000 metric tons of wood alone were shipped; in 1891, 2,000,000; in 1896, 3,000,000; and in 1899, 4,200,000. The rise was steady.

f. Wood transported in 1902 included structural and fuel wood; soaked bast (linden); bark products; charcoal; fabricated materials; and materials for match production in a ratio of 313:244:4:4:10:11:3.(30) Most of the wood products shipped by railroad came from the peripheries of European Russia to the central Russian government centers or toward the southern centers of Tsaritsyn (Stalingrad), Yaroslav, Ekaterinaslav (Krasnodar), and others. Fuel wood was shipped shorter distances for local consumption. Prices on Russian railroads were in three categories: sawed wood, staves, and long, round timber; materials, including ties, which were not listed in the first and third categories; and fuel wood, posts, and other wood of secondary importance. As an example, the cost structure for the first category materials ranged from 1/30 kopek for each Km. Sixteen Kg was transported up to 440 Km. From 440 - 1320 Km. The cost for 16 Kg was 8 kopeks plus 1/200 kopek for each kilometer.

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g. In 1912, the following wood products passed through six railroad stations (Mazeikiai, Kalkuny, Molodechno, Lida, Grodno, Virbalis) on the eastern boundary of the Lithuanian Province:

Items	Total Exports Tons	Total Imports Tons	To Prussia Tons	From Prussia Tons
Corn Products	80,000	33,000	28,000	33
Salt	7,115	13,540	328	-
Oil & Petroleum	13,100	25,426	500	70
Coal	16,230	67,400	50	33
Fuel Wood	55,380	100,000	1,700	-
Structural Wood	222,400	70,000	38,200	50
TOTAL	394,225	309,366	68,778	186 (31)

h. In 1910, 277,780 tons of wood and wood products were exported by railroad from Lithuania of which 170,000 tons were imported from Poland, and White Ruthenia and were merely in transit. The difference of 100,780 tons was native Lithuanian production. During the same year, 1,000,000 tons were transported by water.

i. The railroads were important consumers of fuel wood as well as of coal and oil. In 1890, 39% of the fuel on the railroad was wood, but by 1903 it had dropped to 12% as coal and oil became more important.(32)

9. Customs(33)

a. Imported wood was assessed a tariff as follows:

(1) Birch, beech, elm, oak, spruce, willow, maple, linden, larch, alder, aspen, fir, pine, poplar and ash -

(a) In fascines, chops, or as fuel wood -- no duty.

(b) Timber - 100 kg = 18 kopeks

(c) Unplaned lumber - 100 kg = 54 kopeks

(d) Planed lumber - 100 kg = 90 kopeks

(2) Other wood - logs - 100 kg = 234 kopeks

(3) All veneer or plywood sheets - 100 kg = 1188 kopeks

(4) Cork bark - 100 kg = 90-594 kopeks

(5) Fabricated wood

(a) Plain 100-306 kopeks

(b) Excelsior - 100 kg = 306 "

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(c) Staves - 100 kg = 414 kopeks

(d) Quebrankh - no duty

(e) Pulpwood - 100 kg = 108-360 kopeks

(f) Turpentine - 100 kg = 648 kopeks

(g) Calaphony - 100 kg = 360 kopeks

(h) Tar and Resin - 100 kg = 540 kopeks

(i) Methyl - 100 kg = 360 kopeks

b. The German authorities charged the following duties on Russian wood (mainly from the Lithuanian Province):

Round timber -- 100 kg = 9 kopeks

Sawed lumber -- 100 kg = 36 kopeks(34)

Thus, one cubic meter of lumber imported into Germany paid 2.10 rubles duty and a fest meter of timber 52 kopeks.

10. Results of Russian Utilization of the Lithuanian Forests

a. At the beginning of World War I, the forest economy of the Lithuanian Province and the related industries had an increasing potential and a fairly advanced silviculture. The state forests, maintained by trained, college-educated professionals, had improved greatly on a serious, scientific basis and were continuing to improve. They contained a great deal of valuable, tall timber in sufficiently large, ripe stands. Almost all state forests were run according to work plans; there was no excess cutting and some surplus of ripe timber was built up. Artificial reforestation was steadily increasing but was still insufficient. The number of forestry personnel was growing, forestry districts decreasing in size, and forest protection was adequate when World War I began. The supply of wood from state forests was as much as twice as large by 1913 as it had been in 1850, and the income from a single hectare had increased 10 times. The income from forests in all of European Russia grew steadily. In 1907, it was 59,982 rubles; in 1910, 74,976,499 rubles; and in 1913, 96,350,330 rubles.

b. Private forest stands also improved and the law of sustained yield in 1888 (which did not affect property rights) brought increasing production in the private forests, and growing income (mainly from pulp and fuel wood). The supply of ripe wood in the state forests helped to ease the demand on the private forests and to restore their normal balance of timber. In conclusion, forestry in Lithuania in 1914 was about on a normal, healthy basis, although there were still problems to be solved.

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PART II

CHAPTER I

PARAGRAPH C

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(2) Author's estimate

(3) Ibid

(4) Surozh, II/35

(5) Author's opinion

(6) "Musy Girios", 1933, p 274

(7) Ibid, p 484

(8) Ibid, p 477

(9) Lachnicki, 1817, p 39

(10) Viliusis, J, "Lietuvos gyv. Aprupinimas Misku", "Musu Girios", 1940, p 546

(11) A Raummeter is used in measuring cord wood. It is 70% of a cubic meter.

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(14) "Kovenskaya Gubernia", 1861, p 391

(15) Braun, J, "Forests and Forestry in Poland and Lithuania", 1878, p 248
Pesotskii, "Inzhenernyi Spravochnik", 1924, p 480
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(17) Ibid, III/12

(18) Ibid, III/22

(19) The first steam driven saw mill was established in Kaunas in 1870, Skerys, p 40

(20) "Statistines Zinios Apie Lietuva iki", 1914, p 140

(21) Afanasyev, p 425

(22) Bilder von Litauen, 1917

(23) Rimka, A, "Lietuvos Ukio Statistika

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(26) "Svod Zakonov Russiskoi Imperii", Vol X, Part I, Art 2201-2290

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(28) Ibid, III/75

(29) Ibid, III/80

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(31) Rimka, A, 1922, 77

(32) Surozh, III/15

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